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Main Pulmonary Artery Injury after Penetrating Chest Trauma: Case Report

Case Report

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Author Details

Jamisson Garrote Teixeira[1], Jaqueline Teixeira Silva Valença[2] and Marcella de Albuquerque Wanderley[3]*

[1]Vascular Surgeon and Trauma Surgeon, Hospital Geral do Estado HGE, Brazil

[2]Physician, Centro Universitário Tiradentes, Brazil

[3]Resident of General Surgery, Santa Casa de Misericordia, Brazil

*Corresponding author

Jamisson Garrote Teixeira, Vascular Surgeon and Trauma Surgeon, Hospital Geral do Estado, Maceió AL, Brasil

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Abstract

Penetrating trauma to the heart and great vessels usually leads to immediate tamponade or exsanguination. Mortality rates for injury to the central pulmonary arteries or veins are greater than 70%. The objective of this study is to describe a case of a patient who suffer a stab injury of the main pulmonary artery. The management adopted in the case enable the patient survive and get discharge.

Keywords: Main pulmonary Artery Injury; Vascular Trauma; Cardiac Tamponade; Cardiopulmonary Resuscitation.

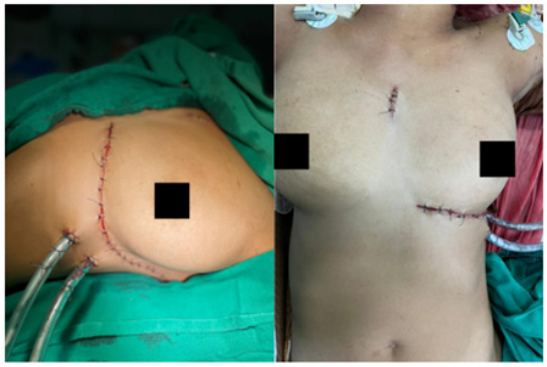
Abbreviations: ICU: Intensive Care Unit; CTA: Computed Tomography Angiography; PAI: Pulmonary Artery Injury; CPR: Cardiopulmonary Resuscitation; ED: Emergency Department

Introduction

Penetrating trauma to the heart and great vessels usually leads to immediate tamponade or exsanguination. It also may present a similar injury of blunt trauma, including partial transection with formation of a traumatic false aneurysm, an intimal flap, thrombosis, or a rare arteriovenous fistula [1]. Mortality rates for injury to the central pulmonary arteries or veins are greater than 70% [2]. The aim of this article is to report a case of a patient who sustained an intrapericardial penetrating injury of the pulmonary artery, and the interventions that led to her survival.

Description of the Case

A 35-year-old female was brought to the emergency department sustaining a stab injury on her chest, located at the middle of the sternum. She was presenting no pulse, but some respiratory efforts (gasping), which ended quickly. So, it was started cardiopulmonary resuscitation (CPR) at the same time she was being transferred to the OR. She underwent a resuscitative thoracotomy, opening the 5th left intercostal space, which showed cardiac tamponade. After the pericardium widely opened, blood and clots were evacuated, it had been possible to see a small laceration of the main pulmonary artery, with a slight bleeding from it. The wound was repaired sutured with a 5-0 Prolene (Ethicon) and a piece of pericardium, used like a patch (Figure 1 and 2). Cardiac activity was returning slowly, so open cardiac massage was performed, followed by epinephrine injection, getting an increase of the hemodynamic state. The heart and the other great vessels were then carefully inspected, and no other injury was identified. The chest wall was closure in a normal fashion and two chest tubes were inserted. At the end of the procedure, the patient had received a total of two blood transfusions, maintained stable and was forward to the Intensive Care Unit (ICU). The endotracheal tube was removed in the first day after her surgery. Pneumonia was treated during her hospitalization. Computed Tomography Angiography (CTA) in the eighth postoperative day confirmed no other vascular injuries and the supposed track of the knife, also no evidence of bleeding or pseudoneurysm (Figure 3). The patient recovered from her injury and was discharged on the tenth postoperative day.



A B

Figure 1:

A. Entry wound already sutured after procedure

B. Left antero-lateral thoracothomy and two thorachostomy tubes placed (one anterior and another posterior).

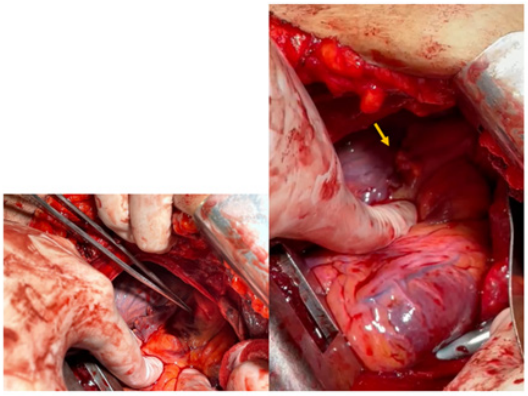


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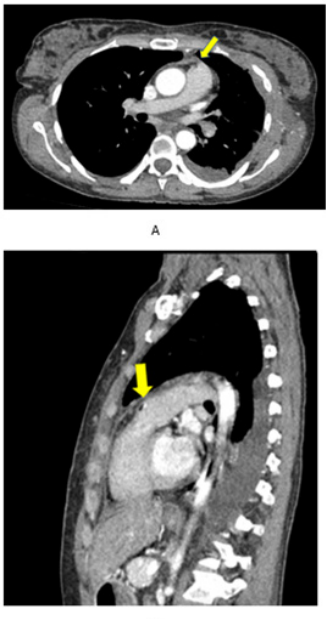
Figure 2:

A. Main pulmonary artery injury before suture.

B. Main pulmonary artery injury after suture.



A

B

Figure 3: CT Angiography control in the eighty postoperative day showing the injury localization in main pulmonary artery (arrows) and track tangent to the sternum.

A. Transverse

B. Sagittal

Discussion

Pulmonary artery injury (PAI) is a rare, lethal clinical entity. Although, if it can be managed appropriately and promptly in patients without cardiac arrest, the patient may be saved. Even a small brunch injury (transection or rupture) can cause fatal exsanguination in seconds, and yet can also be easily controlled with gentle compression [3]. Salvage of individuals with imminent cardiac arrest or those already undergoing CPR often requires immediate thoracotomy as an integral component of their initial resuscitation in the emergency department (ED) [1]. We opted to move quickly our patient to the operating room to perform all maneuvers together with the anesthetic team. Besides, that transportation take only some seconds and one of the physicians was performing CPR.

Traumatic PAI is anatomically classified into four categories. Tear or laceration (including transection, rupture, disruption or perforation) may present symptomatology like cardiac arrest or hemodynamic insufficiency due to massive hemorrhaging or cardiac tamponade, and dyspnea due hemothorax or hemoptysis [3,4]. Pseudoaneurysm can occur, it may stabilize and spontaneously resolve or expand and rupture. Surov et al described a case of delayed diagnosis of pulmonary artery aneurysm 60 years later [3,5]. Traumatic fistulas occur between the PA and left atrium, internal mammary artery, aorta or pulmonary vein [6]. Traumatic pulmonary artery dissections usually resolve or remain stable unless associated with pulmonary hypertension [3,7].

English literature reports of PAI, published between1990 to 2018, showed that penetrating injuries were more frequent than blunt ones (62% and 38%, respectively). In that series, documented by Yanagawa et al, the most prevalent type of injury was rupture (52%) and injuries caused by knife correspond to 20% of the total [6]. According to Mattox, the intrapericardial pulmonary arteries are approached optimally via a median sternotomy, and morality rates for injury to the central pulmonary arteries or veins are greater than 70% [1,2,8]. Most survivors the injury is located in the hilum [9]. In the case above, due in extremis condition of the patient, we performed an antero-lateral thoracotomy as a resuscitative thoracotomy, but the access of the main pulmonary artery was achieved even so. We also believe that due the low pressure of the pulmonary artery, the severe hemodynamically condition and the type of the injury contributed to make the bleeding smaller at the procedure.

Conclusion

Pulmonary artery injuries are rare and present high mortality rates. There are no strict guidelines about PAI management, and the approach depends on the lesion, patient and institution. Due its gravity, as soon as possible the patient arrives into the emergency department, better the chances of surveillance. We described a case of a patient successfully treated surgically.

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Conflicts of Interest

No conflicts of interest declared concerning the publication of this article.

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